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AUTHOR Hill, Katya; Romich, Barry
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ABSTRACT

This brief paper describes automated language activity monitoring (LAM), an augmentative and alternative communication (AAC) methodology for the collection, editing, and analysis of language data in structured or natural situations with people who have severe communication disorders. The LAM function records each language event (letters, words, phrases, sentences) from the AAC system and attaches a time stamp. The data stored in the LAM is then periodically uploaded to a computer for editing and analysis. This paper briefly discusses collecting language samples, processing raw LAM data, analyzing LAM data, and privacy concerns. It is felt that LAM can be useful in the areas of clinical intervention, outcomes measurement, and research in providing objective data on the quality and quantity of communication performance. (Contains 13 references.) (DB)

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AAC BEST PRACTICE USING AUTOMATED LANGUAGE ACTIVITY MONITORING

By

KATYA HILL &
BARRY ROMICH

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AAC Best Practice using Automated Language Activity Monitoring

Katya Hill, CCC-SLP
Edinboro University of PA

Barry Romich, P.E.
Prentke Romich Company

ABSTRACT
AAC automated language activity monitoring (LAM) tools are making practical for the first time the collection, editing, and analysis of language data gathered during structured sessions or from interactions in the natural environment. Implications are significant in the areas of clinical intervention, outcomes measurement, and research.

INTRODUCTION
Since the emergence of the field of AAC, professionals, family members, and consumers have agreed that the desire to communicate is the primary reason for using an AAC system. In fact, the goal for AAC is to provide the system and services that result in the highest level of personal achievement for the people who can benefit from the use of an AAC system (Hill & Romich, in press). Little research is available based on the actual communication of people who rely on AAC. Further, the AAC clinical intervention process seldom takes into consideration in an objective way the use of the AAC system between periodic therapy sessions. Conventional methods of monitoring AAC system use are based on personal observation and video or audio recording with subsequent observation, timing, and/or transcription. The cost of this approach is high because of the human time investment and the availability of the data is untimely. Consequently, professionals seldom collect data on the actual daily environmental use of AAC systems by consumers.

Determining the effectiveness of clinical intervention requires evidence. With few, if any, exceptions, clinicians providing services to people who rely on AAC have not had the luxury of time necessary to obtain language samples from actual use of the AAC system in the natural environment. The obvious solution to this situation is the automation of the language data collection and analysis processes. There have been some efforts made in this area, all integral to specific communication or writing systems (Miller, et.al., 1990; Ahlsen & Stromqvist, 1999; Copestake and Flickinger; 1999). Some commercially available AAC devices have included limited features that monitor use, but until now none have incorporated time information.

LANGUAGE ACTIVITY MONITOR (LAM)
Romich and Hill (1999) are in the process of developing and testing the function of language activity monitoring. Work has been done on two configurations. Modern high performance AAC systems now include LAM as a standard built-in internal feature. For older AAC systems that have a serial port representation of what is spoken, an add-on LAM device is available from Prentke Romich Company. The LAM function records each language event (one or more letters, words, phrases, sentences, etc.) from the AAC system and attaches a time stamp. The data stored in the LAM over time is then periodically uploaded to a computer for editing and analysis. This uploading process can happen without custom computer software and the data can be transmitted as an email attachment or saved on a floppy disk for transmission or transport to a different location for analysis.

COLLECTING LANGUAGE SAMPLES
Language samples can be gathered using various techniques in structured sessions. These include picture description, interview, narrative, and conversation. In addition, samples can be gathered in the long term (days or weeks) in the natural environment.

PROCESSING RAW LAM DATA
The raw LAM data must be uploaded into a computer for editing and analysis. Presently, the HyperTerminal program which is part of Windows is being used for this. The use of a standardized reporting protocol provides for universal compatibility with computer-based applications (Hill & Romich, 1999). Below is an example of how the raw LAM data looks once uploaded into HyperTerminal:

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20:37:00 "I need "
20:37:05 "*[VOLUME UP] * "
20:37:06 "*[VOLUME UP]* "
20:37:07 "*[VOLUME UP]* "
20:37:14 "something "
20:37:16 "to drink "
20:37:19 "i"
20:37:20 "m"
20:37:24 "m"
20:37:28 "ediately "

Once the raw LAM data is in HyperTerminal the text can be copied, pasted and edited in a word processing document. The final product is a language transcript that can be used for analysis. The above utterance example would look as follows after being edited:

I need something to drink immediately.

ANALYZING LAM DATA

After LAM data is uploaded into the computer and the raw data has been edited, the text is analyzed using standard and/or custom vocabulary and language analysis software applications. Various parameters to be analyzed could include:

- vocabulary diversity
- frequency counts
- spelling versus whole word access
- morphological usage
- lexical or semantic usage
- syntactic structures
- developmental levels.

LAM data analysis at the time of this writing has been based on the Systematic Analysis of Language Transcripts (SALT) (Miller, 1983). The time required to upload, edit, and analyze a two hour language sample of over 100 utterances from a high-end user takes approximately 15-20 minutes using these procedures. Simpler analysis, such as word searches, may take only a few minutes. The development of LAM tools to support editing and analysis will reduce analysis time significantly. Table 1 is based on SALT analysis of data from a two hour language sample collected from an intermediate user in the natural environment.

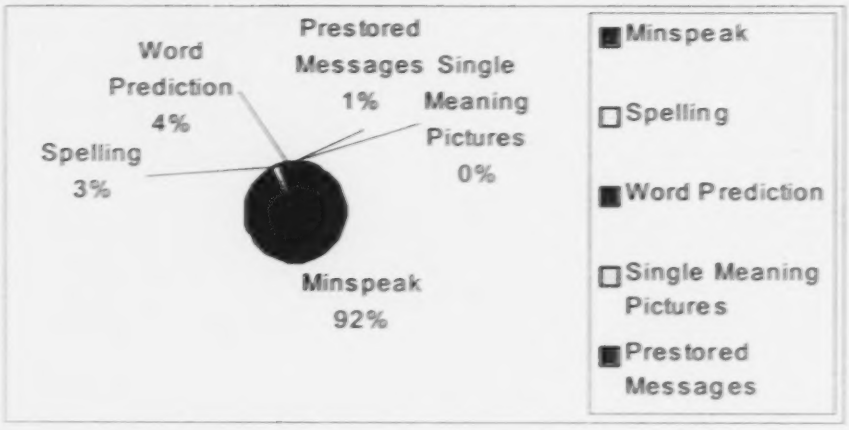
Table 1: SALT analysis

Language Analysis Feature	Results
Total number of utterances	116
Mean length of utterance (MLU)	4.92
Number of different word roots	190
Total main body words	571
Type Token Ratio	.33

To satisfy needs other than those addressed by standard language analysis programs it may be necessary to develop custom applications or use manual methods to analyze the LAM data. Examples of this could be analysis of use of particular vocabulary items since the previous therapy session, calculation of communication rate using the time stamps, methods used for language representation (single meaning pictures vs. spelling vs. semantic compaction), and error rates and types. Table 2 reports data collected from a high end user after two hours of recording in the natural environment.

Table 2: Language Representation Methods

Language Representation Method	Number of Words	Percentage
Total word count	766	100%
Total Minspeak words	707	92.3%
Total whole messages	1	0.8%
Total single-meaning pictures	0	0%
Total spelled & predicted words*	53	6.90%
Total spelled words	23	2.99%
Total predicted words	30	3.90%
Predicted /(spelled + predicted)	30/53	56.6%
Total letter codes	0	0%



PRIVACY

One important issue in the use of any recording device is privacy. Both the LAM device and the internal LAM function provide for disabling the recording. It is strongly recommended that people whose communication is being monitored be clearly informed and that public use of recorded communication be anonymous. The LAM report header starts with the warning:

***** CAUTION! *****
The following data represents personal communication.
Respect privacy accordingly.

SUMMARY

Current best practice in AAC implementation emphasizes communication outcomes based on a team selecting outcomes from a functional curriculum model (Blackstone, 1990; Hill, 1996; Gray, 1998). AAC outcomes can be determined by noting positive changes in the attitudes of teachers, classmates, co-workers and others toward the consumer (Calculator, 1998). However, the tools described here provide more objective data to represent the quality and quantity of communication performance. Clinicians using LAM tools are able to document daily use of targeted vocabulary and language representation methods thus facilitating the intervention process across environments. AAC teams have the instrumentation to develop and monitor Individual Education Program (I.E.P.) goals and objectives and to qualify the implementation strategies and techniques used to facilitate AAC system use.

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Katya Hill, CCC-SLP
Assistant Professor
Assistive Technology Center
Edinboro University of PA
Edinboro, PA 16444
Tel: 814-732-2431
Fax: 814-732-2184
Email: khill@edinboro.edu

Barry Romich, P.E.
Prentke Romich Company
1022 Heyl Road
Wooster, Ohio 44691

Tel: 330-262-1984 ext. 211
Fax: 330-263-4829
Email: bromich@aol.com